Devices that use a scintillating screen viewed via a CCD camera have shown to be very efficient in the collection of large amount of data during clinical-commissioning (e.g. beam width in air for different energies in case of scanning). The electronic read-out of such devices can be very advantageous since it allows on-line analysis of the data just measured. Amorphous silicon detectors are also worth mentioning since they have shown promising properties and may play an important role in the future.
Relative dosimetry along the beam direction has the purpose to measure pencil beam depth-dose curves or depth-dose profile for homogenous SOBP. Large plane-parallel ICs (e.g., diameter > 8cm) are ideal tools for integral depth dose measurements in case of scanning. In addition to the charged deposited by the primary beam, the wide active area of large plane-parallel ICs allows collecting the charged deposited also by secondary proton propagation under larger angles. Alternatively, small plane-parallel ICs in broad beams could also be employed to obtain pencil beam depth dose curves when the chamber is significantly smaller than the lateral size of the field, which is usually the case in passive scattering. Plane-parallel chambers are also ideal for measurements of the distal fall-off. Multi-layer ionization chambers (MLIC) can effectively measure and verify the range of a large number of beam energies and can be used for routine QA.
Detectors for relative 3D dosimetry, which combine 1) and 2), such as, gel and PRESAGE, were tested under proton radiation but, as of today, they are still not employed routinely, mainly because of the LET and energy dependence and the time-consuming preparation and evaluation.

SYMPOSIUM: DELINEATION TOOLS FOR NORMAL STUCTURES

SP-0213
The need for training in contouring: The FALCON answer
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Contouring is the cornerstone of modern radiotherapy. Inconsistencies in contouring target and critical structures can seriously undermine the precision of conformal radiation therapy planning and are generally considered to be the biggest and most unpredictable source of systematic errors in radiation oncology. The importance of « correct contours » for organs at risk is crucial to asses and to predict early and late toxicities. The relevance of dose constraints to organs at risk when establishing and validating a dosimetry highly relies on the contouring of organs at risk. In addition normal tissue contours may help in patient positioning or for the assessment of dose through adaptive schemes in particular with image guided radiation therapy.
Several studies have shown strong interobserver variability in organs at risk contouring and its dosimetric consequences indicating the need for a system to reduce this variability. Several methods have been used to improve contouring accuracy. An increasing number of guidelines on the contouring of organs at risk have been published over the last years. Contouring atlases have demonstrated to serve as a robust tool for accurate delineation of organs at risk. Despite anatomical definition for organs at risk some discrepancies remain even when using guidelines possibly due to miss-interpretation of the guidelines, of anatomical images or use of suboptimal imaging modality.
In this context ESTRO decided to create a multifunctional platform for contouring to offer online educational and professional services. FALCON is a web-based service that provides hands on training tool available from any computer connected to the internet. FALCON was created in 2010 and has already achieved a number of various activities as it was successfully used in 19 different ESTRO courses and pre-meeting courses, 12 live and online contouring workshops, 2 on line free cases open to all ESTRO members at any time most convenient for them. FALCON has been used for the development and dissemination of contouring guidelines. Repeated evaluation of the use of FALCON have been performed and analyzed.
Due to its success an exponential developing plan is made for FALCON in the coming years with implementation of new live and on-line ESTRO workshops, multiplication of the free on-line ESTRO cases, integration of this service in more ESTRO teaching courses, possible access to a library of ESTRO cases and methodological and pedagogical developments that will need further evaluation. In the future FALCON could be putted into a broader perspective serving clinical and pedagogical research programs, as a quality assurance tool.

SP-0214
Auto-contouring system: Changing the practice
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Background: The tremendous technological development that involves the field of Radiotherapy is modifying all the phases of treatments, with a great impact in the Treatment Planning step.
Since the era of modulated radiotherapy allowed us to prescribed dose to the organ at risk (OaR) as well as to the target volume, delineation is becoming complex and, overall, time consuming. Moreover, practice of replanning, increased the flow of imaging that must be contoured (replanning CT, CBCT images).
In the last few years we have seen the development and the implementation of the Atlas-based autosegmentation softwares tested for clinical practice use, which could have an impact in the daily workflow of treatment planning.
These systems simply called “autocontouring softwares” base their function on the possibility to contour various structures automatically with ensuring the consistency of delineation and time saving.
Purpose: The object of the presentation is to evaluate the reliability, the time efficiency and to show the basic tools for the evaluation of the structure delineation of an ideal workflow using an autocontouring system. Smart Segmentation Knowledge Based Contouring® (SS-KBC), developed by Varian, has been used in a research program in pelvic delineation of locally advanced rectal cancer.
Methods: 14 consecutive patients were selected between October-December 2011. The images of 4 were used as an atlas and 10 used for validation. Two independent operators participated – a Delineator to contour and a Reviewer to perform an independent check (IC). The CTV, pelvic subsites and OAR were contoured. RT were involved in the the OaR delineation. Contouring session have been divided in four different sequences These included **A: manual**, **B: autosegmentation**, **C: autosegmentation +manual revision**, and **D: manual +auto-segmentation+manualrevision**. Contouring was performed by the Delineator using the same planning CT. All of them underwent an independent check by a Reviewer. The time required for all the contours were recorded and overlapping evaluation was assessed using Dice coefficient.
Results: In the clinical practice setting there have been 13 min of time sparing between sequences A vs. sequences B (from 38 min to 25 min, p=0.002), a mean Dice coefficient in favor of sequences A for CTV and all subsites (p=0.0195). In the educational/training setting there have been 35.2min time sparing between sequence C and D 8 from 73.1min to 37.9 min, p=0.002).
Conclusion: The preliminary data suggest that the use of SS-KBC may help to improve time sparing in contouring in the clinical practice setting, without avoiding Indipendent Check, and it could have a tutorial role in the educational/training setting. Two prospective studies are ongoing in a larger series of patients.

SP-0215
Clinical application of auto-contouring systems: Challenges and pitfalls
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Purpose: In 2009 an initial version of atlas-based autosegmentation (ABAS, Elekta) was provided to our department for validation and clinical evaluation. In this presentation the main results will be presented and the current application of this software in our daily clinical practice will be presented.
Methods and Materials: Basic input for the auto-contouring software are one or more so called atlases. Atlases consist of fully contoured reference CTs for a specific treatment site. Using either a single atlas or multiple atlases a structure set for a new CT can be automatically generated. In an initial study we evaluated the differences between the use of a single-subject atlas versus a multi-subject atlas for head and neck cancer patients. Next, a clinical validation study on the application of auto-contouring software for this target site was performed[1]. To assess the quality of the automatically generated contours, the similarity between those structures, edited auto-contours and manually delineated contours by an expert were derived using dice coefficients and mean distance between structure sets. In addition the impact of using the auto-contouring software on hands-on time was assessed. In a final study, the necessity of editing automatically generated contours before using them for treatment planning was evaluated[2]. Clinically acceptable IMRT plans were